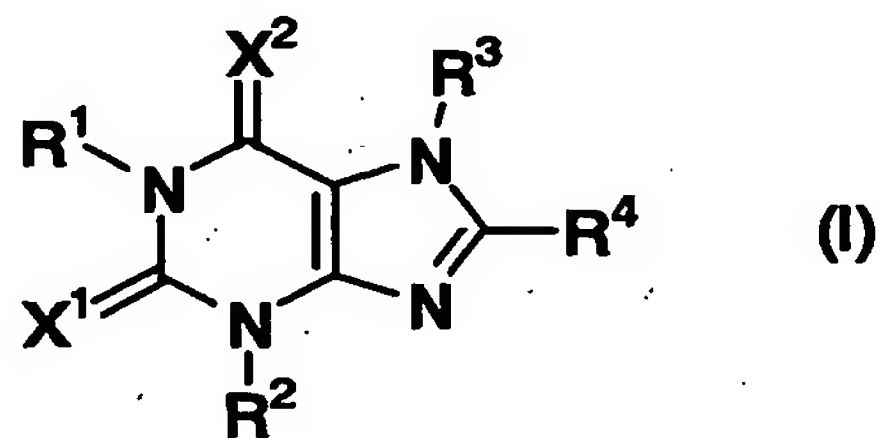


# CLAIMS

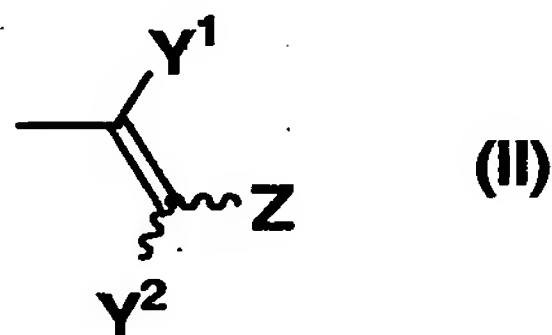
1. An agent for preventing and/or treating higher brain dysfunction comprising, as an active ingredient, a xanthine derivative represented by formula (I):



[wherein

R<sup>1</sup>, R<sup>2</sup>, and R<sup>3</sup> are the same or different, and represent a hydrogen atom, lower alkyl, lower alkenyl or lower alkynyl;

R<sup>4</sup> represents cycloalkyl, -(CH<sub>2</sub>)<sub>n</sub>-R<sup>5</sup> (wherein R<sup>5</sup> represents substituted or unsubstituted aryl, or substituted or a unsubstituted heterocyclic group; and n represents an integer of 0 to 4) or a group represented by formula (II):



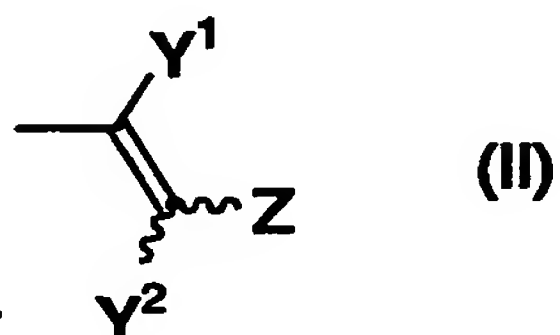
(wherein Y<sup>1</sup> and Y<sup>2</sup> are the same or different, and represent a hydrogen atom, halogen or lower alkyl; and Z represents substituted or unsubstituted aryl or a substituted or unsubstituted heterocyclic group);

X<sup>1</sup> and X<sup>2</sup> are the same or different, and represent an oxygen atom or a sulfur atom]

or a pharmaceutically acceptable salt thereof.

2. The agent for preventing and/or treating higher brain dysfunction according to claim 1, wherein X<sup>1</sup> and X<sup>2</sup> each is an oxygen atom.

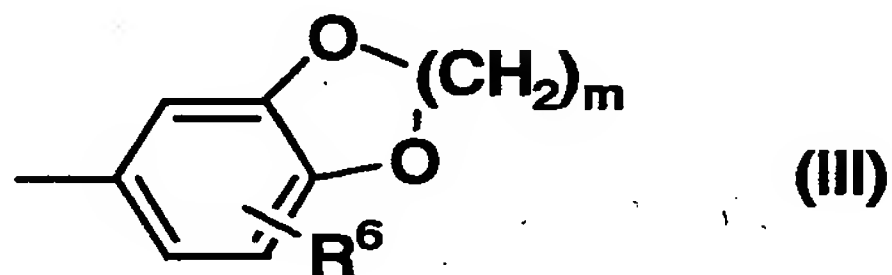
3. The agent for preventing and/or treating higher brain dysfunction according to the claim 1 or 2, wherein  $R^4$  is a group represented by formula (II):



5 (wherein  $Y^1$ ,  $Y^2$  and  $Z$  each have the same meanings as defined above).

4. The agent for preventing and/or treating higher brain dysfunction according to claim 3, wherein  $Y^1$  and  $Y^2$  are both hydrogen atoms.

10 5. The agent for preventing and/or treating higher brain dysfunction according to claim 3 or 4, wherein  $Z$  is substituted or unsubstituted aryl or a group represented by formula (III):



15 (wherein  $R^6$  represents a hydrogen atom, hydroxy, lower alkyl, lower alkoxy, halogen, nitro or amino; and  $m$  represents an integer of 1 to 3).

20 6. The agent for preventing and/or treating higher brain dysfunction according to any one of claims 1 to 5, wherein the higher brain dysfunction is a higher brain dysfunction caused by brain injury.

7. The agent for preventing and/or treating higher brain dysfunction according to claim 6, wherein the brain injury is a brain injury due to aging.

25 8. The agent for preventing and/or treating higher brain dysfunction according to claim 6, wherein the brain injury is

a brain injury due to a disorder selected from the group consisting of head trauma and cerebrovascular accident.

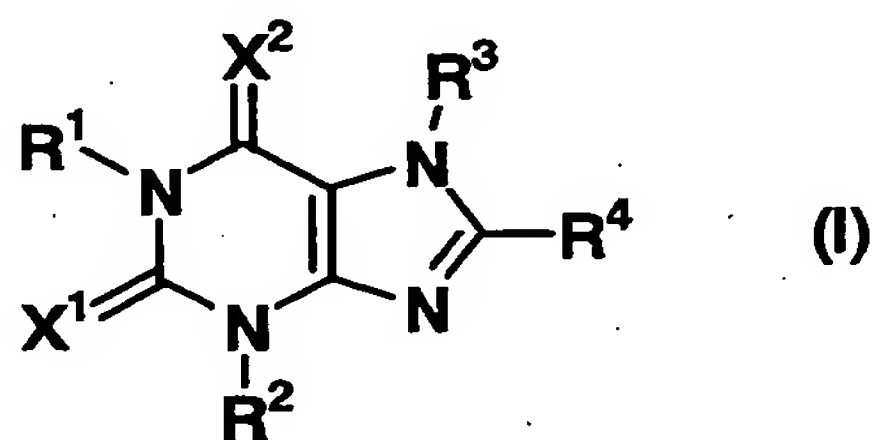
9. The agent for preventing and/or treating higher brain dysfunction according to any one of claims 1 to 8, wherein the higher brain dysfunction is an impairment of higher brain function selected from the group consisting of memory, thinking, recognition, action and learning.

10. The agent for preventing and/or treating higher brain dysfunction according to any one of claims 1 to 8, wherein the higher brain dysfunction is a brain dysfunction selected from the group consisting of agnosia, amnesia and apraxia.

11. The agent for preventing and/or treating higher brain dysfunction according to any one of claims 1 to 8, wherein the higher brain dysfunction is a memory impairment.

12. The agent for preventing and/or treating higher brain dysfunction according to any one of claims 1 to 8, wherein the higher brain dysfunction is a learning impairment.

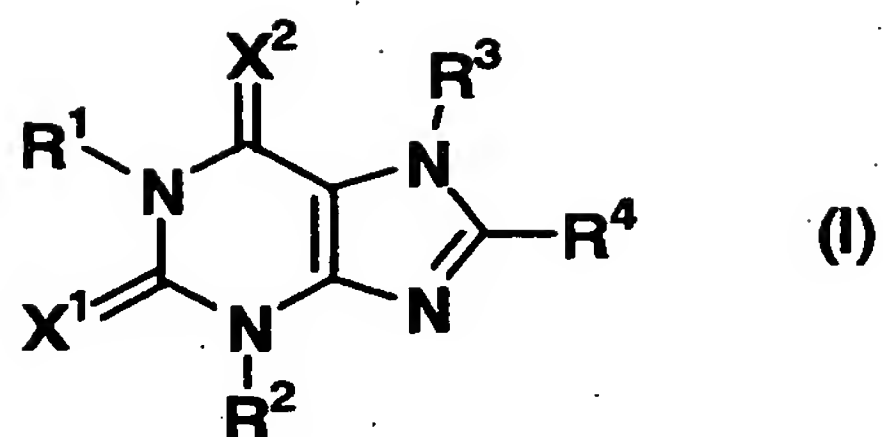
13. A method for preventing and/or treating higher brain dysfunction which comprises administering an effective amount of a xanthine derivative represented by formula (I):



[wherein R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup>, R<sup>4</sup>, X<sup>1</sup> and X<sup>2</sup> each have the same meanings as defined above]

or a pharmaceutically acceptable salt thereof.

14. Use of a xanthine derivative represented by formula (I):



[wherein R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup>, R<sup>4</sup>, X<sup>1</sup> and X<sup>2</sup> each have the same meanings as defined above]

or a pharmaceutically acceptable salt thereof for the  
 5 manufacture of an agent for preventing and/or treating higher  
 brain dysfunction.